THE NECESSITY OF MAKING BREAKTHROUGHS EVEN AND UNIFORM AT THE MINES.

BY MR. JAMES W. HAUGHEE, OF NELSONVILLE, O.

To the Ohio Institute of Mine Engineers, Gentlemen:

For the interest of good mining, I desire to call your attention to section 298 in the mining law, which reads as follows: "No miner shall work his place more than sixty feet in advance of a breakthrough or an air course."

If there was only one seam of coal worked in the State, this breakthrough law might be all right. But that is not the case, as there are eight different seams, which vary in thickness from 26 inches to 10 feet. Allow me to ask which of these seams the present breakthrough law would properly ventilate, as I am convinced that it should not apply to all the seams alike, for instance the volume of air is much greater in the thick seam than in the thin, and its purity is equivalent to the number of feet that the seam is thick, and for this reason I am convinced there should be more than one distance specified in the mining law to regulate breakthroughs.

The sixty foot law often causes unnecessary contention. For instance the mine inspector visits the 2½ or 3 feet seams, and will find men working not more than 40 feet from his last breakthrough or air course, and his air will be very impure and not fit to work in, and should the inspector request a breakthrough made he is told it will be made when the distance is 60 feet.

This is invariably the case where yardage is paid, and it is the mine foreman's advantage of the law.

Then for instance the inspector will visit the thicker seams, where breakthroughs every sixty feet are not necessary, and are detrimental to the mine, yet probably the miner will say he is beyond his distance, and although his air may be good, he will insist on his right to make a breakthrough for the purpose of getting the yardage which may be customary to pay, and after he has made it will not hesitate to obstruct it with slate and unsaleable coal, or any rubbish they may have.

The farther we go between breakthroughs in entries the better it is for the ventilation, as every breakthrough except the last one made must be closed and made air-tight, and the more breakthroughs we have the more brattices there are to keep in repair. We often request the breakthroughs made in rotation through the rooms to get a perfect system for ventilation. But I do not consider this method at all times advisable, especially where the roof is any ways tender, as it has a tendency to weaken the ribs at the same place and encourage a squeeze. A very bad habit is practiced in making breakthroughs by not making them a uniform width and leaving the surface rough, and very frequently only half of the last cut taken out, this often occurs in machine mining as the laborer does not consider the importance of a uniform width for the ventilation.

If the mine generates gas, there should be no jogs left in the roof for the gas to lodge against and prevent it passing with the current.

And it is often the case in mines that generate gas, that a breakthrough is necessary at 25 or 30 feet for safety. When we consider all the points mentioned and that we are working eight different seams of coal, which vary in thickness so much, then why does the mining law fix the distance at sixty feet, regardless of the seam the mine may be in, it has been said by some of our best and most competent mine managers that there should be no breakthrough law to fix the distance, but should be left to the judgment of the inspector, mine foreman and miners what the proper distance should be for different mines in different seams of coal according to its thickness. I would not advocate a revision of the law of this kind, as it might be more abused than the present law, but would favor a law fixing the difference in the distance between breakthroughs according to the thickness of the seam.

I would just add that I wrote this paper from my own experience and from the difficulties that I know occur all the time through the different mining districts.

THE CHAIR: Gentlemen, you have heard the paper of Mr. Haughee, which I suppose ought to have some discussion. There are very pertinent matters in it, and I hope that somebody will start a discussion upon the matter. I think it is a very pertinent point he makes here in regard to the effect of the law at present. I certainly coincide with him myself that the sixty foot law, for different seams as we have in Ohio, is very incorrect. I differ with him to some extent, in the revision as he says. I believe it

would better done to leave it to the mine inspectors and mine bosses to say when they should be made. There is no question in my mind, but as the law stands now, it is to a certain extent in-operative. Why it was made sixty feet I suppose, was that the parties that got the bill through, probably done so for the reason that sixty feet would have suited them under the conditions that they were working, and that bring me back to what I spoke of in the first place; that while a man might be perfectly competent under certain conditions of mining, if you take him into another condition of mining he would be very incompetent, for the reason that he has not that theoretical knowledge of mining. I think we ought to have a little discussion on this paper.

MR. ROY: Mr. President, as I drew up the first law, and was one of a committee of three miners in the Mahoning region, this became the law of the State; I would say that we put it in at first that the break-through should be made every forty feet, and that afterwards I reached this conclusion, that if it should be done at all the law ought not to state at what distance the break-through ought to be made, nor ought the mine inspector to interfere in the matter. The law should state, as it does in emphatic language, that the mine shall be kept free from standing gas, and there shall be a certain current of air playing along the working faces of the mine and that the mine inspector should see that that current of air is playing there. And if not, that the mine owner and operator should be made responsible in law, as they are now. Now, I may be wrong in this, but I have long held that view that if it could be done that no one ought to interfere with the management of the mine; that the law should simply require that the mine should be perfectly safe and healthy, and that, in addition, no matter whether the break-through is five feet, ten feet or fifty feet, that when the mine is not healthy that the party working the mine should be made responsible for it, fined and punished as the law requires. The point is well taken that the sixty feet or the forty feet does not well apply to the different seams, and if forty feet is a sufficient distance to make a break-through in a thin vein, a mine having double the thickness with the same amount of ventilating power would have more than

double the amount of air; so that if there is enough air in a thin vein there is more than enough in a thick vein, and that would argue in favor of the break-throughs being farther apart, for we all know, and my friend, the President, knows from experience, that the less break-throughs you make the more money you have to pay for the running of the mine. I simply make these remarks that the younger members and those giving these matters more attention, will get a clue on which to make the discussion.

MR. HARRY: It seems to be almost impossible in some cases to get a break-through now, when we have the advantage of the law. The law says that you shall make a break-through every twenty yards. But that is not all of it. The law goes on to say that the inspector has discretionary powers, and if he don't think that they should be made every twenty yards, he has a right to make them farther apart, and I don't see if he can make it more than twenty yards, why he can't make it less. The law says the men shall not work where it is not fit for them to work. And if it is not fit to work sixty feet ahead he can make it forty feet. If you had no law at all on the subject, we would not get any break-throughs at all, because in a great many places—at least that has been my experience, and I expect that some of the other men here can bear me out in it—we couldn't get any breakthroughs without the law. It is very hard now to get them, not with the operators but with the men. I have had more trouble in getting the men to make breakthroughs than the operators. I think if we had no law at all with regard to it, or no stated distance to make them, that we would not get any at all in a great many instances.

MR. HAUGHEE: While the law says or recognizes the discretion of the inspector, or mine boss or whoever has the power to lay off the breakthroughs, in the same section it says that no miner shall be more than sixty feet in advance of a breakthrough or air course. That is the point I based my paper on.

THE CHAIR: The discretionary matter as Mr. Harry has it —now we will suppose that an entry is in sixty feet and the miner that works there would say that they ought to have a

breakthrough. Now it seems that the discretionary power is, that the mine inspector or mine boss will say no, you can get along without a breakthrough. The air is good, I want you to go further. He will not do it. Then there is a strike. Consequently we will have to wait for the inspector to come, and it may take a week, it may be, to decide the matter. In regard to the other matter I don't know; for myself, I never knew a miner yet that was perfectly willing to make a breakthrough, and for a very good reason, because he gets well paid for it. Now I am speaking from my own standpoint and not from any other vein or seam in the State. I take the same stand as in the beginning, perhaps what is practical with me would be impractical in another seam, but that is the rule with us that the miner is perfectly willing to make a breakthrough, and more than willing, because he gets the yardage practically for nothing. His breakthrough dosen't cost him anything. He blasts on the solid, gouges in and can make as much out of his breakthrough between rooms as he can without making a breakthrough. It is true it is different between entries, because we invariably think we ought to have not less than four or five foot openings between the entries, consequently there you must cut. Yet I never knew an entry man with us but was willing to make a breakthrough. He has more yardage and can put in more time when the cars are scarce. Now the other proposition that Mr. Harry brings in, that it would be pretty hard to get breakthroughs at all. Now I think he is representing it pretty hard on the operator. I think it is like skinning a man and then rubbing salt in, for this reason; of necessity they belong to that part of mining, they are necessary. There are not necessary evil as the old saying is but they are a necessity and must be had. It is true, sometimes a mine boss perhaps thinks that the men can go a little further and try to evade the thing, but he must make breakthroughs, at least if he wants to work his mine properly and to the best advantage. There is no loss to the operator by making breakthroughs at the proper distances, none at all, not any more than there is to drive counter entries. I can remember the time very well and Mr. Roy can, and the older men here can remember very well when in this

State all the mining was done by single entry. Now then, probably you can not go to a single mine in the State but the system is double entry. They have learned that it is a benefit. It costs more to open it, but in the end it is a benefit. It is just the same as I said here in the beginning. It costs more to start a mine methodically and properly and leave the proper pillars, than by gouging out, but in the end it is better.

It is better for the operator. He gets more coal out and makes more money, and I believe as Mr. Roy says that breakthroughs should probably be left to the mine boss, and the mine inspector of course when he comes in there and finds insufficient air he will step in and say, "here, you must do it." Now, it is unreasonable in my opinion, to ask by law that I, in a vein that is 5 feet thick, should be required by law to make breakthroughs regularly every 20 yards or 60 feet, while Mr. Roy, in a vein of 2½ or 3 feet, is under the same law, and he has only 60 feet or 20 yards. Now, there is no reason in it, not a single bit of reason. Then another thing, suppose now you are driving an entry—you practical miners understand that—and the rooms open out close to the face right along. Suppose on the other hand you have an entry where there is not a single room in it within 50 yards of the face. Now we all know as practical miners that you can go further, more healthy and better air in that entry at 30 yards than you can where the people are crowded in the other place at 20 yards. Consequently that is against this law and in my opinion, as Mr. Haughee said here and Mr. Roy, I believe that the 60 feet feature of the law is a thing that should be eliminated, and leave it to the discretion of the mine boss under the direction of the inspector when he comes there, or else make it so many feet according to the thickness of the vein.

SECRETARY HASELTINE: Mr. President, the last remarks of our worthy President comes nearer the mark in my judgment than any I have heard in this discussion. I have given this matter a great deal of consideration for a good many years, and more especially for the last four. When I took charge of the department I was unable to find a mine in the State that was ventilated in accordance with the spirit of the mining law in this particular.

There was no effort made or no practical results from it in which the air was carried to the working faces of the mines. It seems to have been a well established principal that with a sufficient current as required by law upon the entry that every provision of the mining law was complied with. The question of breakthroughs every 60 feet was absolutely impertinent. Under that condition, no matter what the thickness of the coal was, at least 60 feet was the outside limit, whereas in a thinner vein of coal it should have been less, perhaps not to exceed 40 feet. In attempting to carry the air to the working faces it became manifestly unjust to the operators, for instance in the No. 8 or Pittsburgh seam that was 6 feet in thickness to compel them to cut their breakthroughs every 60 feet, while the operator in the Tuscarawas or Mahoning or upper coal fields where it was 4 feet or under were compelled to work 60 feet. I tried the experiment in Belmont County of turning the whole current of air into the rooms and carrying it through the working faces, and there we made breakthroughs for a time at a distance of 30 yards apart, and it was our experience, our practical experience, that in the 6 foot coal there was better air at the face of the coal 30 yards in advance of a breakthrough than under similar circumstances 20 yards in advance of a breakthrough in coal that was 4 feet and under. Now where the breakthrough should be I have never been able to determine, I have never had the opportunity, but there is no doubt but that there should be a graded law for making breakthroughs in proportion to the thickness of the coal. As Mr. Harry says, and I think every mine inspector that has any connection with the department in his life will bear me out, that if there was not a law compelling breakthroughs at stated distances we would have had no breakthroughs at all. As it is under the present law if a mine inspector misses a mine for three or four months nine times out of ten he will find men working 60 and 80 yards ahead of air. The bank boss will blame it on the miner and the miner on the bank boss. It all comes to the same thing, they won't make breakthroughs until they can't help it. When I first came in there was a large portion of the State where there was no stated price for making breakthroughs,

as there are some portions of it yet where there are no rules. The miner was told when he complained about his air to make a breakthrough, and when he asked if he would be paid for it he would be answered "why you know you will," or something of that kind, but he never got his pay. It was a common complaint to us that they got no pay for breakthroughs and in some instances they resorted to the plan of taking grip shops on the rib, and shooting the rib from opposite sides until it was so thin that with a sledge or the end of a bank prop they could burst a hole through and that answered the purpose of a breakthrough. There is plenty of that kind of mining in the State to-day. I have in mind a case that occurred in Belmont County, and the squeeze came on and they lost their entries and rooms. They set out the claim that breakthroughs at regular intervals or breakthroughs at all in rooms was disastrous to that seam of coal, and they carried it into the Courts of Belmont County, I think on the petition of Capt. Morris and my predecessor, and they made it appear to the Court that it was ruinous and the Court sustained them in the petition and decided against the department and the law as to the practice of making breakthroughs at 60 feet in the No. 8 seam in Belmont County. Now if you resort to a discretionary law with the bank boss or the miner you will never have any breakthroughs at all. There is no way that I know of in which it can be brought to a practical determination except practical experiment, and then I don't think it will be absolute but it probably will be a great deal better and fairer than it is at the present time. There is no one of any judgment or experience in mining but what will admit that in the Hocking Valley, where the coal is 13 feet in thickness, that a breakthrough every 60 feet with a strong current of air upon the entry is entirely unnecessary and unjust burden upon the operator. If an effort was made to relieve him of that burden and allow him to drive his breakthroughs at greater distances all the operators that are mining thinner coal will jump on to the proposition with both feet, because it is allowing him who has a natural advantage in the thickness of his coal to produce much cheaper than they can. Now the bank boss is very frequently charged with being neg-

ligent, and we often punch him pretty hard when as a matter of fact he is not the party to blame for the situation. Our coal production is drifting into the hands of a few men. Within the last few years the small operators of the Hocking Valley are substantially squeezed out of the business. The syndicates are managing the large products of our mines. They compare their coal account and their pay roll each month and figure exactly what the cost of production per ton of coal is. If it is greater than the month previous they call their superintendent or bank boss to account for it, and he is given fair warning that they don't want that repeated. In order to save his situation he economizes in every way possible, and if he can dodge the department in any way and avoid making a breakthrough, it is that much in his favor. The more breakthroughs he can avoid making the better he is off, and that is the reason we are having so much trouble in having breakthroughs made with any kind of uniformity.

MR. HARRY: The reason I made the statement that we would not have any breakthroughs if it was not for the law; when I first went on the force in going through some of the mines—but I want to correct you in one thing—you are in error in regard to part of the State. In the southern part of the State I think the majority of the coal mines in the Jackson district are mined on the single entry, all the small mines there are run on the single entry system. But it was not there that I complained of. It was in the Hocking Valley in the big vein. I could show you very handy now, rooms worked for 70 or 80 yards and never saw a breakthrough, and the rooms instead of being 40 feet were 40 yards. There never was a breakthrough made until there was a hole broke through to draw the pillar back. I know the trouble we experienced in getting breakthroughs made. It was about the time we went on the force that the 60 foot law came in force, and that was their excuse for not making breakthroughs. They would show me rooms worked clear up without any breakthroughs at all, and if we had no law, no compulsary law to make these breakthroughs, I claim yet there would be very few breakthroughs made.

MR. ROY: I want to say a word, and that is I am glad this paper was read. The point I wanted to make is that if the law does require there shall be a certain amount of fresh air playing along the face of every working face and the miner was able to say that this law is not enforced now, then the question of breakthroughs would take care of themselves. Whenever a room went so far that the law was violated and the mine owner made responsible, or the boss made responsible for neglect then that would settle itself. In one place it might be 40 yards, and in another place it might not be 20 yards. The object of the law is to make these mines healthy and not to interfere with the management at all, and if the mine inspectors—and Lord knows there is enough of them now, for I had eight years of it and only myself—if there is not enough now, let us have some more, so that fresh air is playing along the working faces in every mine in the State. If we can find some means by which the miner can examine that air and we have boys in the Institute now that are able to do it, and say by chemical tests that it is not such that the law requires, let them impart that to the mine boss, and let the mine boss prepare himself by a series of examinations, so that he can test the air in the mine himself, in other words let us be moving forward and progressing so that we can get these things settled as they ought to be. We are wiser now than we were 20 years ago. It is a mistake to interfere with the management of a mine any more than you can help it, but it is not a mistake to say that every working face in a mine must have pure air.

SECRETARY HASELTINE: Mr. Roy, there are 800 mines in the State and there are 7 mine inspectors. That makes an average of over 100 mines to the inspector. Now is it possible for a mine inspector to get around more than once every three months for instance in the large districts. Now, if you are going to have this air tested and a man is in a room to-day, that is approaching the point where it should have a breakthrough, it will be three months before that mine inspector will get around if he visit all the mines in his district before he goes there. And who is going to measure this up and determine whether there should be a break there before the mine inspector comes back.

MR. ROY: Why the miner himself, the mine boss.

QUESTION: But who is going to compel the mine boss to do it?

MR. ROY: Here is another answer to it, if you haven't enough inspectors double them.

SECRETARY HASELTINE: Well there are 7 of them and there are 800 mines.

MR. HARRY: What do you call a working face?

QUESTION: Where the miner is digging the coal. The law requires that every man in the mine shall have 100 feet of fresh air playing along the working faces of the mine where he is using his pick, and if there are a hundred men there should be 10,000 feet of air.

MR. HARRY: If that is the case how are you going to get it to the faces without making breakthroughs.

MR. ROY: The breakthroughs would have to be made, but the point is not to provide by law for something that is impossible. The Courts of Belmont County said it was not possible to comply with it. If that law had been followed in Belmont County every mine there would have gone down. The business sense of this thing would be to make paramont the fact that the air must be clean and sweet at all times, and not that there should be a breakthrough every 20 or 60 feet or 40 feet.

SECRETARY HASELTINE: There is no current of air after you get a certain distance beyond a breakthrough.

MR. ROY: Certainly there is.

SECRETARY HASELTINE: After you pass a breakthrough beyond a certain distance, of course that distance depends upon the volume of air that is in circulation, but after you have passed that a certain distance there cannot be a current.

MR. ROY: Yes, there is a current.

SECRETARY HASELTINE: It is so delicate that it cannot be detected.

MR. ROY: If the law requires there should be a hundred feet there it ought to be there, and let us go at the sensible part of the matter. Let us get sweet air. We all know what that is. We know if there was no current a man could not live, that his life would go out, and when he has not got that air his light goes out and he has to go home; but there is a certain distance from the breakthrough where there is a current of air playing. There is what we would call an eddy, that comes in below and goes out above. The air is not all of the same weight. It is lighter or heavier and that caused the play. Of course if you go up so far it ceases. You may go in sometimes in entries a hundred yards and you will find a current, stronger in winter than in summer-time perhaps.

SECRETARY HASELTINE: You have no instrument to measure it.

MR. ROY: You have chemical tests to determine it.

SECRETARY HASELTINE: You could tell of course whether there are any gasses in it or not.

THE CHAIR: I understand the point Mr. Roy makes, and that is that he wants to make breakthroughs when it is actually necessary for the benefit of the men that are working in the faces wherever that is.

MR. ROY: Understand me, I say it is not practical now. I don't wan't a law like that passed, but I wan't to work up in that direction.

THE CHAIR: Well I understand that is your point, whether that can be done with breakthroughs or without breakthroughs. It seems they went without breakthroughs before the mining law was passed if I understand the chief and Mr. Harry, because before this law was passed they wouldn't make any breakthroughs and consequently must have gone without any breakthroughs.

SECRETARY HASELTINE: Didn't have any air to go.

THE CHAIR: I am glad Mr. Harry called my attention about the Jackson mines. When I talk I generally talk from the standpoint where I am acquainted and not where I am not

acquainted, and that brings me back to what I said here to-night, that a man might thoroughly understand the work where he is situated, while under different conditions he would not know what to do. We have to remember in Ohio that the method of mining has changed a good deal in 25 years, and in most of the mines of the State that I know of double entry is invariably used.

SECRETARY HASELTINE: Is it universal in the Tuscarawas field now?

THE CHAIR: I think it is universal except for a short entry that you don't expect to go but a few yards but where you expect the entry to go any distance whatever it is practiced entirely.

SECRETARY HASELTINE: It is not in the upper Tuscarawas?

THE CHAIR: Well, that might be too. Well, gentlemen, is there anything more on this question? I think it has brought out some knowledge to all of us, at least to me.

MR. ROY: Here is a fact that ought not to be overlooked, that while perhaps Messrs. Haseltine and our friend here were a little too strong in saying there were no breakthroughs, yet the air was very bad in those days, and the condition was far from what it ought to have been. And it is a fact that there was not a single furnace in the Hocking Valley nor a single mine boss in the Hocking Valley when the law went into effect that had ever seen a furnace except one man. They didn't know what it looked like. When you talk to them about air they would say, "how can I get air until I can get through the hill."

SECRETARY HASELTINE I did not mean to cast any reflections on any former management at all, because I realized as Mr. Roy says, the crude condition of the mines of the State when he was inspector and the gradual advancement in mining as we have become more enlightened on the subject; but I still maintain that there should be a stipulated distance for breakthroughs, and passing that point by a miner or operator should be a criminal offense and punished. But I do think that the law govern-

ing those distances should be regulated by the thickness of the coal and the surroundings. A mine that generates fire-damp would, of necessity, require breakthroughs more regularly, more uniformly and at shorter distances than it would in the same thickness of coal in a mine which does not. Now this theory of a current of air beyond the eddy from a breakthrough is true theoretically, but practically it is so fine that no one is able to detect it.

PROF. SPERR: Theoretically it is not true.

SECRETARY HASELTINE: Practically it is not true either. We do get some once in a while. I have seen it where it was very high, where there were currents of air and you could detect them by the eye, but you could not detect them by any instrument I have ever heard of. And there is a certain distance that you can work beyond this eddy in which the air will be pure; beyond that it will be filled with impurities. Then there should be a breakthrough made when it becomes so impure as to become unhealthy.

PROF. SPERR: I would like to ask Mr. Haseltine whether under his scheme you wouldn't have to leave it to the discretion of the mine inspector. Who else would judge of the surroundings. How could you formulate a law which would bring in all the conditions, and say under such conditions a breakthrough must be made so and so. The mine inspector knows how thick that coal seam is. He knows what the nature of the gasses are in the mine. Why shouldn't it be left with him to say, now in this mine breakthroughs must be made once in so often and that would hold them just as thoroughly it seems to me if the law should say a breakthrough should be made once in 20 or once in 40 or once in 60 feet. Then in another mine when the mine inspector knows the air is of sufficient purity if the breakthrough is made once in 80 feet, let him say so and leave it to him how often breakthroughs should be made.

CAPT. MORRIS: While I was inspector I came to the same conclusion as Prof. Sperr. When I was inspector I had Belmont County down along the river there. There were only three in-

spectors then. I found by close examination that having breakthroughs uniform as we have been told here this evening would not do there. We have a draw slate there and we have a seam of coal over it, and our chief inspector knew when we would get a breakthrough there they would fill it up after we would get another one inside. The roof would give way, that is, that draw slate, and there is nothing in the world could fill or close that up after that draw slate would cave. That little seam of coal that was over it would smolder away just like snuff until you couldn't fill it up at all. Consequently if there was a series of breakthroughs uniform one opposite another there was danger then of it all coming through and loosing your rooms, but by putting one in this room and one there in the other catercornered all the time it did better. I am satisfied that it would be better and that the miners would be better off if it was left to the discretion of the inspectors than for the law to say it must be so and so in one place, and in another because it is necessary to put them perhaps half the distance in one seam of coal than it would be in another. I believe that if it was left to the discretion of the inspectors it would be better for the miners and operators too.

MR. HARRY: I would just like to say that if they make the law that way they won't need to buy any technical instruments. We have about 26,000 of them in the State that would let you know if the air was bad.

MR. ROY: I was just going to ask the Captain how it would be when the mine owner offered the mine inspector $100 to go away.

CAPT. MORRIS: Well, I don't know. They never offered me that, or else may be I would have taken it. (Laughter.)

THE CHAIR: There is nothing like being honest, and honest confession is good for the soul. Well, gentlemen, I am very glad the discussion has come up. Every one that comes up I learn something, but after all in my opinion different maladies require different remedies, and for that reason different conditions of mining requires different modes of ventilation. Where firedamp is very strong of necessity they ought to have the return

air quicker than where there is no fire-damp, and as one of the propositions that I stated before, now I am speaking more expressly of course about our own mine and that is this. You have one entry where your rooms turn right up to the face of the entry, say in a distance of 50 yards and perhaps you have several kegs of powder put off over night. That entry is worked on double terms, night and day, and the men go in there at night. Now then sometimes you have another entry that works only one term, two men, and probably no room within perhaps 50 yards to it. Now then ought there not to be some discretionary power given in there. Now there might be no current of air as our friend here says. Now I don't know whether it is theoretical or practical, but I do know this, if there is no current there I would like to know this fact: how does the smoke get back to the return air-way; it certainly comes. There is no question about it at all. If it didn't go it would be there for all the time, and the more I hear of this discussion the more I am convinced that the starting point that Mr. Roy made is the best, to leave it as much as possible to the discretionary power of the mine boss, and those interested to at all times see that the proper amount of air is there, and that it is healthy for the men at the face of the workings, whether that be 60 feet or 80 feet, it is immaterial, because as I said before under certain conditions you can work 80 feet better than you can 50 feet, especially where you use so much powder. Now in other mines, in the Hocking Valley or in Jackson County, of course that would be entirely different. You don't use any powder. That is where the discretionary power comes in to make the working of the mines proper, because different conditions require different modes of mining just as much as different diseases require different remedies.

MR. ROY: Not discretionary power, but so long as the air is good; not power to say the air is good or not good, but have the air tested and if it is right then go on.

THE CHAIR: As I said, wherever a man is in a room if it is healthy for him to work there all right, if not you want power to make it all right. I think there ought to be some lee way

there, and perhaps I am speaking against my own district because we use more powder than any other district in the State.

MR. ROY: Chemistry demonstrates the condition, that is you know by the analysis of the air whether it is pure or not, and whether it is fit for men to work in or not. Three per cent. of any of these gasses in there would make it unfit to breathe, although the chemists in their books tell you that where a light won't exist life won't exist. You and I have worked in rooms where the light would not work and yet we worked away there.

SECRETARY HASELTINE: How many tons of coal did you ever mine in the dark? (Laughter.)

THE CHAIR: It can't be very healthy where the lamp goes out. It isn't very healthy for a man to live in.

MR. HARRY: That was 50 years ago. We are talking about progression now.

SECRETARY HASELTINE: The latter day saints won't work in that way.

THE CHAIR: People are getting wiser all the time. We ought to know more than we did 25 years ago. This was an interesting paper. It is about as interesting as the last paper I heard him read. I hope he will bring in one at the next meeting. Well, we will now proceed with the further business.

CAPT. MORRIS: I move we extend a vote of thanks to Mr. Haughee for his very valuable paper.

The motion was seconded and prevailed.

THE CHAIR: Now then, shall we go on with anything further. If you think it is proper Prof. Lord is here and his paper is next on the programme. After consultation we have concluded to postpone Prof. Lord's paper, and we will now listen to Capt. Morris on the subject: "The Original Members of the Institute."